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Iot Based Wireless Controlled Smart Transportation System

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ABSTRACT_ The "IoT-Based Wireless Controlled Smart Transportation System" combines several technologies to improve vehicle control, safety, and monitoring. Real-time information display is provided by an Arduino microcontroller interfaced with an LCD; location tracking is done using a GPS module; communication is handled by a GSM module; and a motor driver controls the DC motor. Users can wirelessly control the DC motor via NodeMCU and Adafruit, therefore enabling remote vehicle operation. A MEMS sensor detects impacts in an emergency or accident, activating a buzzer for sound alarms and sending an automatic SMS with the vehicle's GPS location via GSM. For real-time monitoring, GPS data is also uploaded. By use of IoT and wireless communication, the system offers an effective approach to enhance control and transportation safety.

1.INTRODUCTION

The fast changing of the Internet of Things (IoT) has opened the door for creative uses in many industries, including transportation. This work presents an IoT-Based Wireless Controlled Smart Transportation System meant to improve real-time monitoring, safety, and vehicle control. The system enables remote operation and efficient vehicle tracking by use of an Arduino microcontroller, GPS technology, and GSM connectivity. Including sensors for emergency detection increases safety even more by guaranteeing quick reactions to possible mishaps. This project intends to demonstrate how IoT technology can transform transportation management and safety, hence offering a more connected, smarter car experience

2.LITERATURE SURVEY

2.1 Ahmed, M., & Khan, S. (2020). "Smart Transportation System Using IoT." This paper explores the integration of the Internet of Things (IoT) in transportation systems to enhance vehicle tracking and communication. By leveraging IoT-enabled sensors and data analytics, the study demonstrates how real-time monitoring can improve road safety, reduce congestion, and optimize fleet

management. The research highlights various case studies where IoT applications have led to significant improvements in transportation efficiency, paving the way for smarter mobility solutions.

2.2 Patel, V., & Singh, R. (2021). "IoT-Based Vehicle Tracking and Control System."

This study presents a detailed analysis of IoT technologies utilized in vehicle tracking and control systems. It discusses the role of GPS, cloud computing, and wireless communication in enabling real-time monitoring of vehicles. The research also examines the benefits of IoT in enhancing operational efficiency, reducing unauthorized vehicle access, and improving emergency response times. The findings suggest that IoT integration in vehicle management leads to safer and more efficient transportation networks.

2.3 Yadav, P., & Sharma, N. (2019). "Real-Time Monitoring of Vehicles Using GPS and GSM."

This research investigates the implementation of GPS and GSM modules for real-time vehicle monitoring. The study demonstrates how these technologies enable continuous tracking, geofencing, and instant alerts for unauthorized movement. By analyzing case studies and experimental results, the paper highlights the effectiveness of GPS-GSM integration in improving transportation security and accident prevention. The findings support the adoption of these technologies in modern intelligent transportation systems

3. PROPOSED SYSTEM

Using an Arduino-based system combined with IoT for remote vehicle control, real-time location monitoring, and automated accident detection, the proposed "IoT-Based Wireless Controlled Smart Transportation System" solves these limitations. A MEMS sensor for accident detection, a GSM module to provide automatic alerts in crises, and a GPS module to track car location make up the system. Using NodeMCU and Adafruit, the DC motor can be operated wirelessly, hence enabling more efficient and flexible transportation management. Location-based notifications help the system to guarantee quick accident responses, hence enhancing general safety and efficiency.

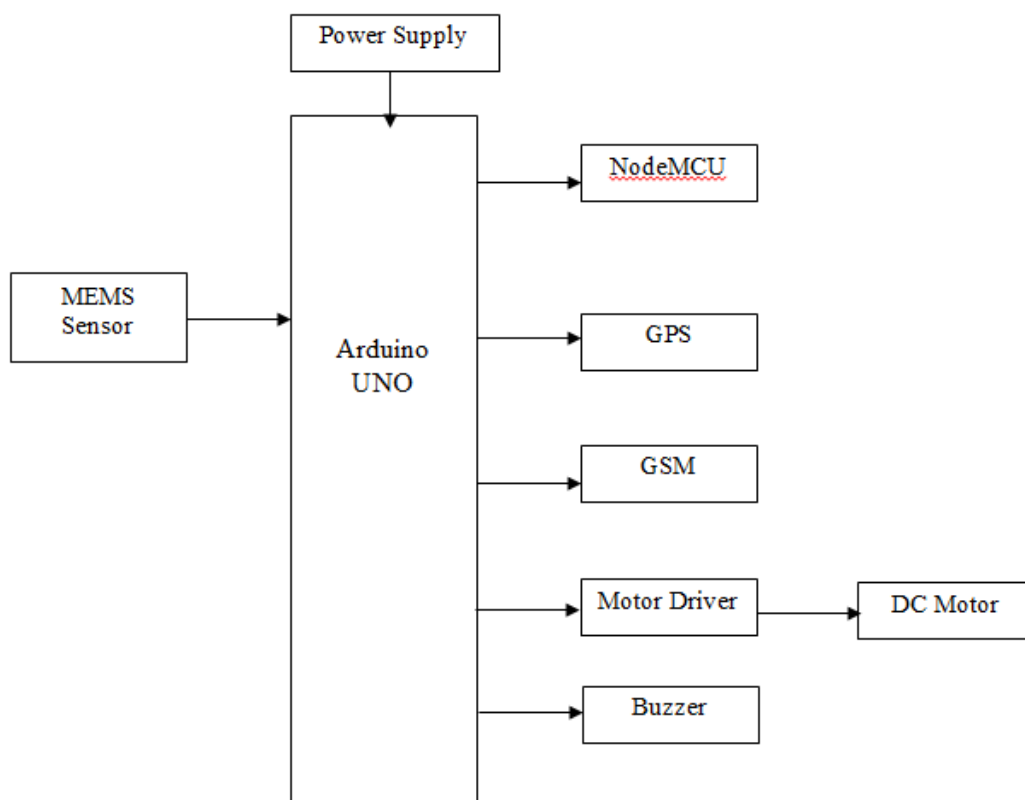


Fig 1:Block Diagram

3.1 IMPLEMENTATION

- - Arduino
- - LCD
- - GPS
- - GSM
- - Motor Driver
- - DC Motor
- - Buzzer
- - MEMS Sensor
- - NodeMCU

3.1.1 ARDUINO

The Arduino microcontroller is an easy to use yet powerful single board computer that has gained considerable traction in the hobby and professional market. The Arduino is open-source, which means hardware is reasonably priced and development software is free. This guide is for students in ME 2011, or students anywhere who are confronting the Arduino for the first time. For advanced Arduino users, prowl the web; there are lots of resources.

This is what the Arduino board looks like.



Fig 2:Arduino

The Arduino programming language is a simplified version of C/C++. If you know C, programming the Arduino will be familiar. If you do not know C, no need to worry as only a few commands are needed to perform useful functions.

3.1.2 MEMS Sensor:

The term MEMS stands for micro-electro-mechanical systems. These are a set of devices, and the characterization of these devices can be done by their tiny size & the designing mode. The designing of these sensors can be done with the 1- 100-micrometer components. These devices can differ from small structures to very difficult electromechanical systems with numerous moving elements beneath the control of incorporated micro-electronics. Usually, these sensors include mechanical micro-actuators, micro-structures, micro-electronics, and micro-sensors in one package. This article discusses what is a MEMS sensor, working principle, advantages and it's applications

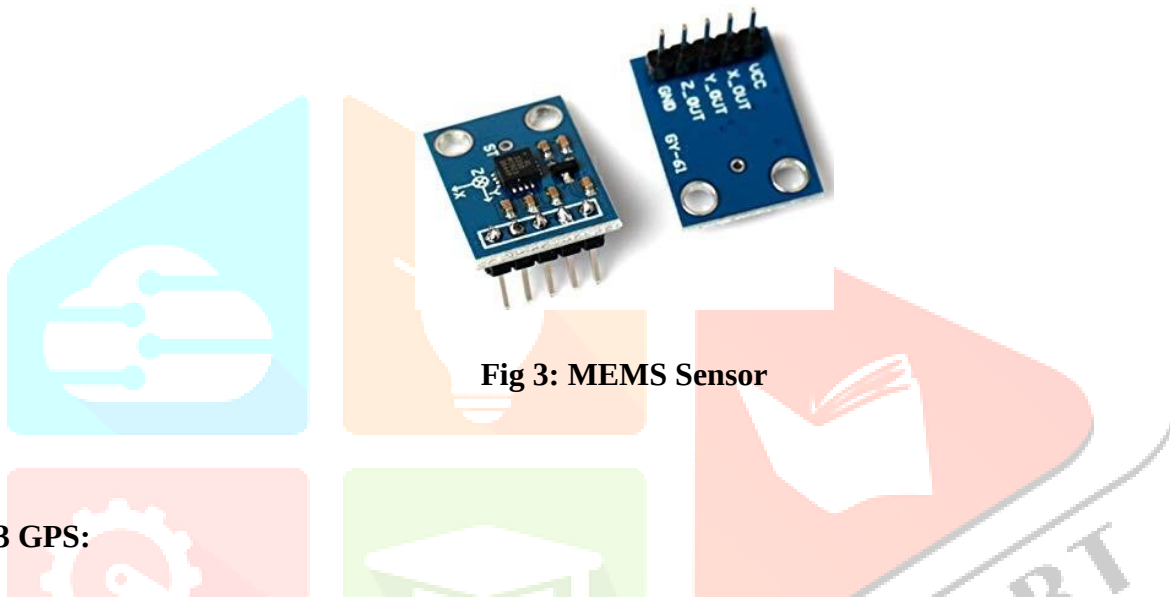


Fig 3: MEMS Sensor

3.1.3 GPS:

Global Positioning System (GPS) is a satellite-based system that uses satellites and ground stations to measure and compute its position on Earth.

GPS is also known as Navigation System with Time and Ranging (NAVSTAR) GPS.

GPS receiver needs to receive data from at least 4 satellites for accuracy purpose. GPS receiver does not transmit any information to the satellites.

This GPS receiver is used in many applications like smartphones, Cabs, Fleet management etc.



Fig 4: GPS

3.1.4 GSM/GPRS Module

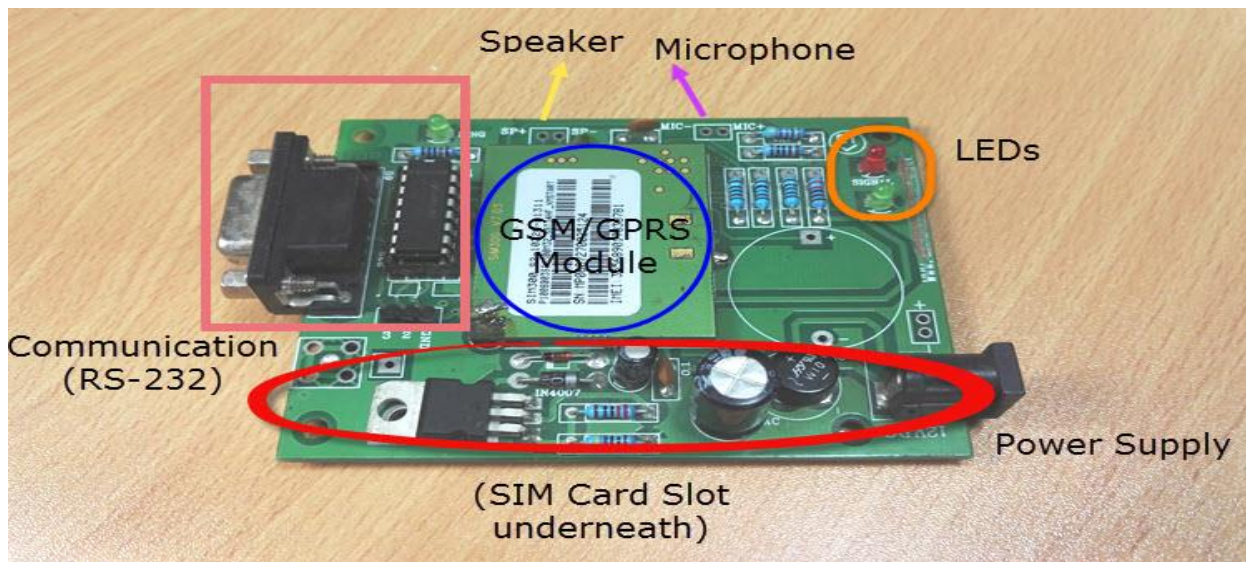


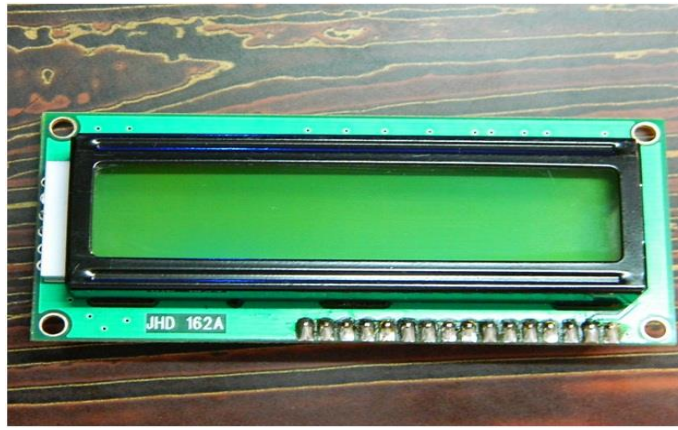
Fig 5:GSM

GPRS Modules are one of the commonly used communication modules in embedded systems. A GPRS Module is used to enable communication between a microcontroller (or a microprocessor) and the GPRS Network. Here, GSM stands for Global System for Mobile Communication and GPRS stands for General Packet Radio Service.

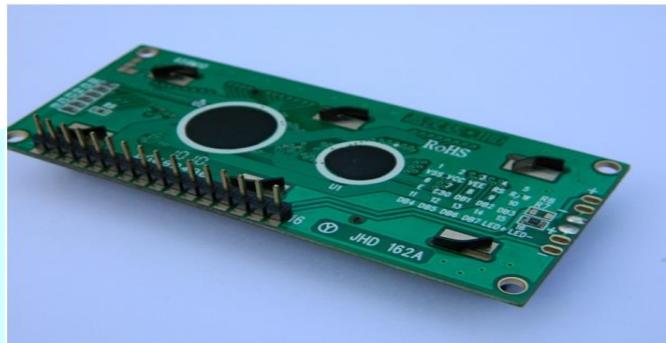
3.1.5 LCD:

Scratch pad displays and other smaller computers use LCD (Liquid Crystal Display), the invention. Like technology for gas-plasma and light-producing diode (LED), LCDs let displays be much more thinner than technology for cathode beam tube (CRT). Because they operate on the principle of blocking light, LCDs use far less electricity than LED displays and gas displays.

A LCD is either constructed using an uninvolved lattice or a display network for dynamic framework presentation. The dynamic framework LCD is likewise sometimes referred to as a meagre film transistor (TFT) display. The passive LCD grid has a matrix of conductors at every pixel intersection across the network. Any pixel's illumination is controlled by two lattice conductors sending current. A working system needs less current to adjust the brightness of a pixel as it has a transistor at every pixel crossing point.



LCD – Front View



LCD – Back View

Fig 6:LCD

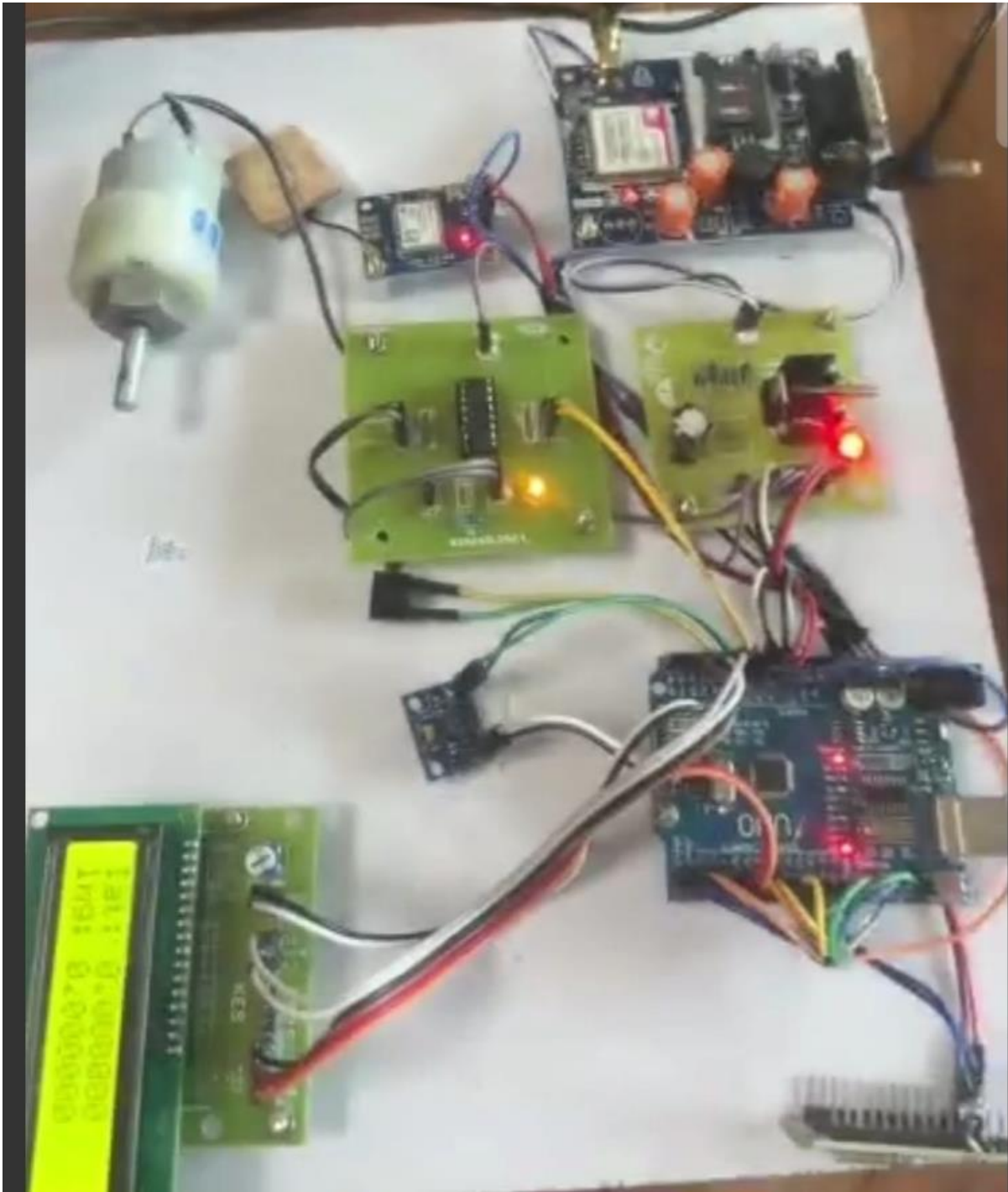
3.1.6 Buzzer:

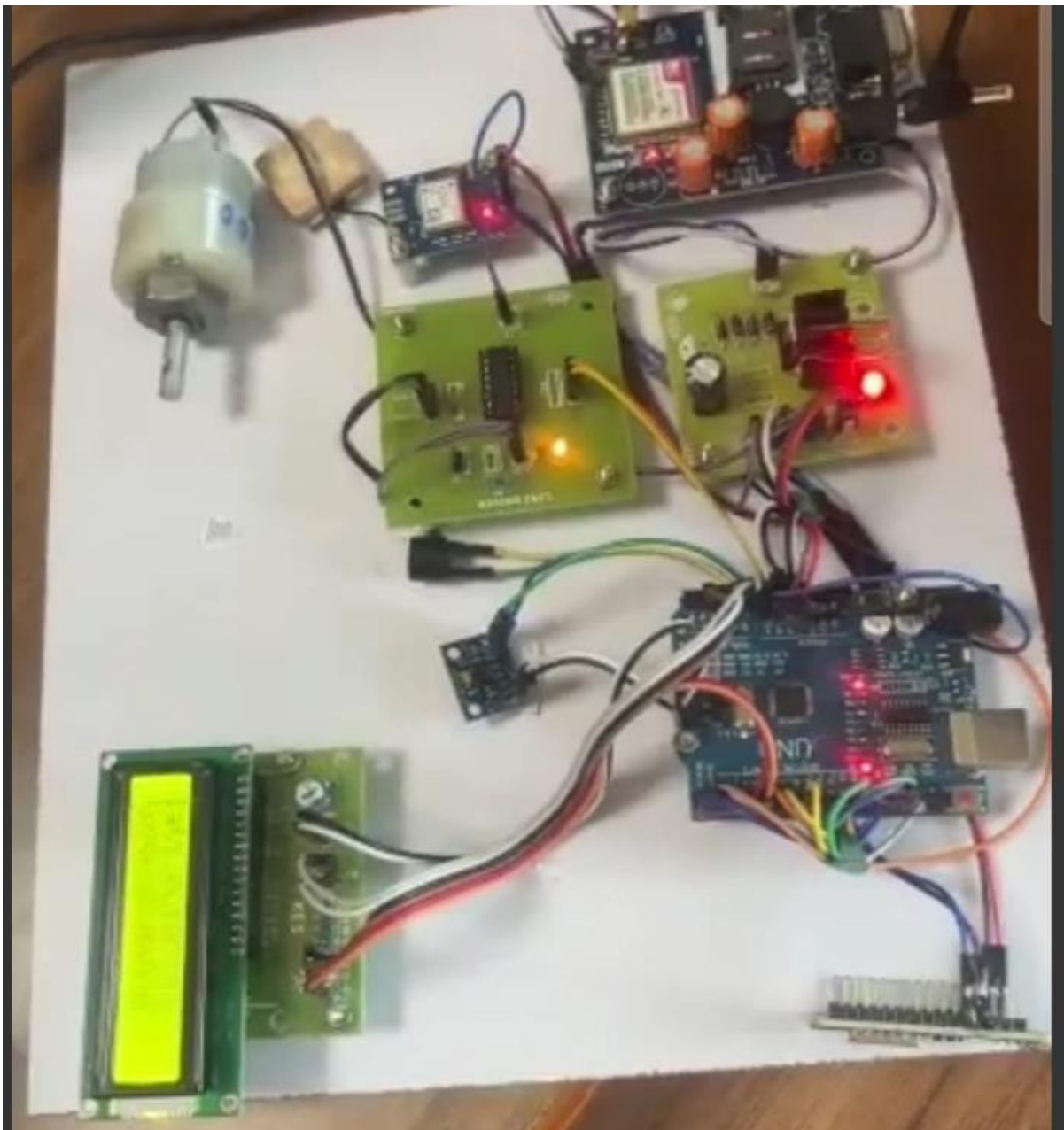
An auditory signalling device, a buzzer or beeper could be mechanical, electromechanical, or piezoelectric. Common applications of buzzers and beepers include alarm systems, timers, and user input verification such as mouse clicks or keystrokes. Buzzer is an integrated system of electronic transducers, DC power supply, commonly found in computers, printers, copiers, alarms, electronic toys, automotive electronic equipment, telephones, timers and other electronic products for sound devices. Five volts active buzzer Rated power can be directly linked to a continuous sound; this part dedicated sensor expansion module and the board in conjunction can complete a simple circuit design to "plug and play..



Fig 7:Buzzer

4.RESULTS AND DISCUSSION





Successfully implemented and tested, the IoT-Based Wireless Controlled Smart Transportation System Through several test cases, all system features—including real-time vehicle control via Adafruit IO, GPS-based location monitoring, and accident detection using the ADXL345 MEMS sensor—were confirmed. Remote commands like start and stop were answered accurately by the car. Both the Adafruit IO platform and the LCD panel showed location data correctly, so guaranteeing continuous monitoring. The system also identified rapid impacts and activated a warning mechanism in case of an accident, which comprised vehicle stopping, buzzer activation, and SMS delivery with exact position via GSM and Google Maps link. All parts validated the design goals of the system by working in concert to guarantee safety and efficiency. The findings show that the project runs consistently and meets its stated objectives, hence providing a smart, safe, IoT-enabled transportation solution.

5.CONCLUSION

Ultimately, the integration of contemporary technology in the IoT-Based Wireless Controlled Smart Transportation System shows a notable improvement in vehicle control and safety. The system improves situational awareness and remote operation capabilities by using Arduino for real-time data processing and including GPS and GSM modules for position tracking and communication. Including a MEMS sensor for impact detection guarantees quick notifications and safety actions in case of emergency. All things considered, this creative approach not only increases efficiency and safety of transport but also shows the changing power of IoT in contemporary transport solutions.

REFERENCES

1. **Ahmed, M., & Khan, S. (2020).** "Smart Transportation System Using IoT." *Journal of Transportation Technologies*, 10(2), 45-60.

This paper discusses the applications of IoT in transportation, focusing on enhancing vehicle tracking and communication systems for improved safety and efficiency.

2. **Patel, V., & Singh, R. (2021).** "IoT-Based Vehicle Tracking and Control System." *International Journal of Advanced Research in Electrical, Electronics and Instrumentation Engineering*, 10(4), 50-58.

This study presents a comprehensive overview of IoT technologies in vehicle tracking systems, highlighting their impact on operational efficiency and safety.

3. **Yadav, P., & Sharma, N. (2019).** "Real-Time Monitoring of Vehicles Using GPS and GSM." *Global Journal of Computer Science and Technology*, 19(2), 22-30.

This research explores the integration of GPS and GSM modules for real-time vehicle monitoring, emphasizing their effectiveness in enhancing transportation safety.

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